An Agenda for DI Computing, Version 3

A general theme for the future of DI computing is recommended, based on taking advantage of industry developments and addressing present limitations of Agency computing.

General Principles:

These are the goals:

> the Agency has a substantial investment in existing computing equipment whose value must be preserved
>
> the DI needs to upgrade the ADP facilities and skills, in order to make use of the latest ADP technology in support of intelligence analysis

We need to modernize DI computing, but as we do so to also improve our ability to utilize new developments as they occur, while preserving the value of earlier commitments by making new software and equipment work with the installed base.

In the past, we have standardized on particular hardware and software, to our peril; that approach has greatly limited our ability to adapt to changes in technology, as our installed base has molded itself to our "standard" hardware, and has made it difficult to transition to anything else. We need standards, but we should standardize on interfaces, not specific hardware and software. Then, any equipment and software that meets interface standards can be used with our systems.

The standards that we set for interfaces need to be in the mainstream of commercial activity. If we standardize on arcane forms of interface, we limit our ability to install new equipment and software.

But what happens when the general direction changes? If all our installed base meets some existing standard, then we can easily change to a new standard, by implementing a small number of transformations. By being willing to change when the marketplace clearly signals such a change, we can continue to be able to take advantage of the most advanced new technology, while preserving the value of our installed base.

There is presently some controversy between some users of ADP in the Agency and OIT over various issues of hardware and software selection. Because standards for interfaces

can have such impact on the ability of users to have their needs met, it is imperative that users be involved in the setting of standards, and that the standard-setting organization operate by consensus rather than majority vote. This method can avoid the raging disputes that now characterize certain OIT-customer relationships.

In summary, the Agency should do the following with regard to standards:

standardize on interfaces, not hardware or software

involve users in setting standards

set standards that are in the mainstream of commercial activity

when the mainstream changes direction, change the standards

DI ADP Requirements

What are the crying needs of DI analysts for ADP? Avoiding details, they need improved usability, improved availability, improved ability to share data within an office, and improved local printing. The DI as a whole also needs more storage than is presently available in the central system, more ports into the central system, and more computing capacity.

Because of the importance of the written word to the DI, there are particularly challenging requirements in the area of office automation. DI analysts need advanced office automation facilities, including advanced word processing, with the ability to display and edit two pages of text side by side on a screen.

There is an important need for sharing of information at various levels within the DI, between analysts in the same and different offices, between analysts and supervisors, between analysts and support people. There is a need to disseminate incoming cable traffic throughout the directorate, as provided by SAFE. All analysts must be able to use SAFE from their desks.

Graphics of all types are omnipresent in analytical work. Our results are commonly presented as map graphics with overlays; photographic images of all types are also part of our product. But beyond the product, there is widespread need for the use of graphics of all sorts during the analytical process, for visualizing hypotheses or displaying data that has some geographic aspect. Any computing facilities for the DI must incorporate the ability to

annotate and print maps and charts at high resolution, and generate a variety of charts and graphs.

Database management is a major area of expanding requirements for intelligence analysis. Only by constructing databases of all types, and applying tools that are available for database query and reporting can analysts hope to deal with the large volume of data collected today. On a large scale, analysts today are extracting information from SAFE cables and storing it in databases so that they can more easily ascertain patterns and trends. The DI need in this area is for a range of database systems that can be used for a wide variety of applications, from the smallest application supporting one analyst to a large application shared throughout the DI. All of those database systems, running on any machine, must have consistent user interfaces, so that databases anywhere in our facilities can be accessed in the same fashion.

There is a need for interoperability of present and planned future systems on the part of the DI. The most prominent such need is the ability for a DI user to be able to create a document on any hardware or software word processing facility available, and then pass that document to another user, who could then proceed to edit the document using any other hardware or software word processor, and send it back to the originator. Such transmittal and editing of documents occurs throughout the DI as part of the publication review cycle, as well as during the production cycle.

The DI's need for increased computing capacity has outstripped the central system's ability to provide it, at least in the near term, with regard to ports, storage and processing capacity.

Technology

What does technology offer in the way of a solution to these problems? These trends are well-established:

user interfaces based on the desktop metaphor, with multiple windows

workstation computers, with significant computing power, local storage, and advanced user interface features

communication servers for connecting to mainframe systems

local area networks for interconnecting workstations, file servers and communication servers

There are three experimental workstation efforts going on now in behalf of DI users, and the advanced workstation concepts they embody have proved to be very attractive to users and potential users. Two are sponsored by the DI and one is sponsored by the DDS&T. The two DI-sponsored efforts use different hardware, neither of which can run software written for the other. The DDS&T effort uses the same Xerox hardware as one of the DI efforts, but all the software is written in a different programming language, so that it cannot be integrated with the software written for the DI effort.

With regard to interoperability, standards for forms of information are emerging that have rather widespread support. Once such standard for document content, DCA (for Document Content Architecture) is now supported by a variety of mainframe, standalone and personal computer word processors; its adoption here, and the acquisition of some transform software, would allow the interoperability of all Agency word processing facilities. Other standards are emerging in areas such as graphics, imagery and network interconnect.

In the database arena, a standard data language, SQL, has emerged for relational database systems. Virtually all current research into database management, and all new systems being developed today, all employ SQL, and SQL is a draft ANSI standard. Database systems are available today that run on machines from the IBM PC to the largest mainframes, and most machines of intermediate sizes as well.

OIT Plans

OIT plans to introduce a new workstation, the IBM 3270 AT, over the next several years. Their plans are that this workstation will be used connected to the central system, with one connection per workstation, through a PBX system that will be installed.

This workstation will be capable of operating as a 3270 terminal, for accessing software that runs in the mainframes, as well as local use as an AT, allowing it to run the wealth of applications written for the AT.

The AT 3270 does not have sufficient resolution in its display to allow two pages to be displayed side by side and edited. Its computing power and disk storage capacity are more limited than many popular workstation computers (of course, its price is lower too).

OIT has offered to the DI to undertake a joint workstation effort, to develop a computer configuration for DI use with their active cooperation, if the DI would like to employ a workstation that is different from the AT that they plan to

offer. Further, they have offered to support such a high-end workstation with their full services at the conclusion of a testbed project.

OIT is acquiring and evaluating IBM's two relational database systems that implement the SQL data language, for VM and MVS.

Directions for the DI

A network of high-end workstations, connected by a local area network to file servers and communication servers, offers the ability to relieve the limitations of the present centralized system as well as fully meeting the needs of DI analysts for computing services.

The use of file servers on the workstation network could reduce the need for connections into the central systems. File servers could receive mail from AIM and SAFE whenever they were sent, and store it locally. Users would pick up AIM and SAFE mail from their local file server, and experience very quick service, rather than waiting while a central facility retrieves each message for display. Thus, for routine use of electronic mail and SAFE, users would not be connected to the central system.

The central system would still be used occasionally, and for such use a communications server would be available on the network. Through the communications server, a user could use any features of the central system.

Local file servers could be accessed at very high speed by users through the local area network, so they could be used conveniently to provide a backup facility for storage at each workstation. An automatic process could back up each workstation's disks on a regular basis at the file server, onto disk or tape. Such backups would provide protection against catastrophic loss of data in event of a hardware failure at a workstation.

If local area networks were configured to correspond to organizational entities, then much sharing of information and mail within the DI could take place directly across the local area network, without placing any burden on the central system.

There is a rare opportunity to serve the ADP needs of the entire Agency (and with it, the DI) by working with OIT to develop workstation networks for the DI. We begin working with them at once to establish a joint workstation project. Because there is an opportunity in this joint project to set standards for what the central system interface to a workstation network should be before OIT makes those

decisions for themselves, we should get started on this effort **now**.

With regard to the present experimental efforts that are underway, any new workstation project should attempt to capitalize on *all* of the experience of the present efforts, and attempt to provide all functions that have found to be useful for analysts in these several projects, plus others that can be defined.

The workstation effort must provide a framework for making ready use of software that is developed in universities and companies throughout the industry that is useful for intelligence analysis. Finally, the workstation network configuration must permit us to make use of advances in hardware as they occur, while preserving our investment in software.

The three current workstation experiments deal with machines that run UNIX, SMALLTALK and LISP. Because of evident industry trends, our workstation effort should focus on UNIX machines, for the following reasons:

there are many vendors of UNIX workstations; as new workstations are offered, we can upgrade the hardware but keep our application software.

there is a wealth of sophisticated software available for UNIX that has potential for intelligence analysis.

a wide variety of advanced software written for UNIX is immediately available to us through the ARPANET.

programmers with UNIX experience are much more available than for LISP or SMALLTALK.